

power is power which is applied to a common electrode of the LCD panel **230** and commonly, $\frac{1}{2}$ power of gamma power is applied.

[0080] The power **240** generates and provides gamma power that the driver **300** uses. Herein, the gamma power is a voltage which is used when the driver **300** makes a voltage to be applied, and the gamma power has a voltage level which is greater than or at least the same as the ceiling value of a voltage to be applied which is generated by the driver **300**.

[0081] FIGS. 7A and 7B are views for illustrating an operation of the display device **100** according to an exemplary embodiment.

[0082] FIG. 7A illustrates that the first timing controller **200-1** is disposed on an upper end of the LCD **230** and the second timing controller **200-2** is disposed on a lower end of the LCD panel **230**. Two lines illustrated on the left in FIG. 7A indicate two electrode lines. For example, one of the two ITO electrodes (transparent electrodes) connects the first timing controller (and the first driver) and the plurality pixel lines and the other electrode connects the second timing controller (and the second driver) and the plurality pixel lines.

[0083] FIG. 7B illustrates that the LCD panel **230** includes 2N pixel lines. For example, an upper area may be an area from pixel line 1 to pixel line N, and a lower area may be an area from pixel line N+1 to pixel line 2N (End). Each pixel may include three light sources which can indicate R, G and B.

[0084] For example, the first timing controller **220-1** may apply a signal which drives a TFT to pixel lines in order from pixel line 1 to pixel line N (in a first scanning direction) by controlling the first gate driver **310-1**. When the TFT is turned on, the first timing controller **220-1** may input an image signal in the first scanning direction by controlling the first source driver **320-1**.

[0085] On the contrary, the second timing controller **200-2** may apply a signal which drives the TFT on the pixel line in order from pixel line 2N (End) to pixel line N+1 (in a second scanning direction) by controlling the second gate driver **310-2**. When the TFT is turned on, the second timing controller **220-2** may input an image signal in the second scanning direction by controlling the second source driver **320-2**.

[0086] By the first timing controller **220-1** and the second timing controller **220-2** alternately applying a driving signal, the display **200** may display an image signal in order of pixel lines 1, 2N, 2, 2N-1, . . . , N-1, N+2, N, N+1.

[0087] FIGS. 8A, 8B, 9A and 9B are views for illustrating a clear difference between an operation of an existing display device and an operation according to an exemplary embodiment.

[0088] The existing display device consecutively scans a plurality of pixel lines as illustrated in FIG. 8A. Accordingly, difference phenomena occur at parts where the first display device **100-1** and the fourth display device **100-4** are connected and where a second display device **100-2** and the third display device **100-3** are connected as illustrated in FIG. 8B.

[0089] However, the display device **100** according to an exemplary embodiment may alternately scan pixel lines of an upper end and pixel lines of a lower end. Accordingly, as illustrated in FIG. 9B, a difference phenomenon occurs neither at the part where the first display device **100-1** and

the fourth display device **100-4** are connected not at the part where a second display device **100-2** and the third display device **100-3** are connected.

[0090] In case of an existing scanning, a difference phenomenon occurs because of a scanning delay which is a time difference between the time in which pixel lines of the uppermost end are scanned and the time in which pixel lines of the lowermost end are scanned.

[0091] FIG. 9B illustrates that a pixel line of the lowermost end of the first display device **100-1** is scanned for the second time, and a pixel line of the uppermost end of the fourth display device **100-4** is scanned for the first time. Accordingly, a scanning delay is reduced from a unit of ms to a unit of μ s. In other words, only a little scanning delay occurs, which pertains to a difference phenomenon which cannot be observed by bare eyes.

[0092] For example, in case of an existing consecutive scanning, the scanning may be carried out by a display device located on an upper end scanning from a pixel line on the lowermost end and a display device located on a lower end scanning from a pixel line on the uppermost end. In this case, a difference phenomenon between the upper display device and the lower display device may be resolved even with the existing consecutively scanning method.

[0093] However, the existing method only pertains to a method which was conceived because both of a normal direction scanning and a reverse direction scanning that the display device **100** according to an exemplary embodiment performs cannot be performed. Also, with an entire video wall, there exists a problem that a difference of a scanning time for an upper end and a scanning time for a lower end gets bigger.

[0094] Also, with the existing method, even though the difference phenomenon on a part where an upper display device and a lower display device are connected can be resolved, a difference phenomenon in a single display device cannot be resolved. The display device **100** according to an exemplary embodiment has an effect to reduce a delay time even in a single display device.

[0095] The display device **100** according to an exemplary embodiment may reduce a scanning delay time to the half by scanning the upper area and the lower area at the same time through the two timing controllers **220-1**, **220-2** and the two drivers **300-1**, **300-2**. For example, when a frame rate is 60 Hz, in an existing single display device, about 16 ms scanning delay occurs but in the display device **100** according to an exemplary embodiment, about 8 ms scanning delay which is the half of 16 ms scanning delay occurs.

[0096] In other words, it is not a difference between a pixel line on the uppermost end and a pixel line on the lowermost end in the display device **100** but it is a difference between a pixel line on the uppermost end and a pixel line on the center or a difference between a pixel line on the lowermost end and the pixel line on the center. Therefore, only about a half of a scanning delay occurs. Because about half of a scanning delay occurs, a user may not perceive a difference phenomenon when watching a screen. For example, when a frame rate is 120 Hz, only about 4 ms scanning delay occurs in a single display device according to an exemplary embodiment, and thus a user cannot perceive such a difference with bare eyes.

[0097] When a display system such as a video wall is embodied by using the display device **100** according to various exemplary embodiments, a difference phenomenon